# BASELINE SURVEY REPORT

## Case study of Uluguru and Usambara mountains

*(Bigwa, Tangeni, Peko Misegese, Mashewa and Misalai villages)*

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***ABSTRACT***

*Agriculture is the back borne of the economy of Tanzania and its main objective is to ensure food security and eradication of rural poverty through the promotion of production systems, technologies and practices that are environmental sound (Tanzania National Environmental Policy, 1999). However, this has not been achieved due to rapid land degradation, which has consequently lead to massive soil loss, decline in crop yields, disruption of water resources and the destruction of the natural resources in general. This report highlights the extent to which agricultural related activities like agronomic and cultural practices such as use of fire for preparation of farms and cutting of trees to meet villagers' needs have devastating effect on the quality of the environment. Besides these observed difficulties this paper argued that as the survival, well being and future of the Uluguru and Usambara people it is essential to provide continuous training to farmers, so that they know how best to continue farming and harvesting forest products on a sustainable basis without causing much harm to the environment. Most of all this paper recommends the introduction of Ngolo cultivation technology on steep slopes of Usambara and Uluguru mountains in order to enhance the conservation of the environment.*

**SUMMARY**

Usambara and Uluguru mountains are high potential areas for Maize, Beans, Pigeon peas and horticulture production. However, production per unit area has been declining over the years due to the worsening problem of land degradation, which has been accelerated by use of inappropriate traditional farming practices such as flat cultivation on the steep slopes. This calls for the introduction of more appropriate farming techniques, which will ensure effective soil and water conservation for improved land productivity. The *Ngolo* cultivation technology, which has been applied successfully in areas like Matengo /Ngoni plateau in Tanzania, is considered one such technique suitable for the Usambara and Uluguru Mountains**.**

Baseline survey results showed that:

1. Yield from cash and food crops have been declining over the years due to decrease in agricultural land, poor agricultural practices (e.g. continuous cropping along the sloppy hills and excessive cutting of trees burning of crop residues which leads to bear land.
2. In Uluguru Mountains farmers who are staying in sloppy lands are forced to shift and cultivate in the lower lands, which result in conflict between farmers.
3. Poor agricultural practices contribute to the degradation of catchments areas.

However, most of the participants during baseline survey especially of Uluguru Mountains suggested that there is a need for conservation measures today more than ever before. Since farmers showed that they are aware of the problems and expressed agent need in solving, thus promotion of Ngolo technology in these areas seem to be one of the ways of conserving soil and water hence increase farm productivity.

This study will provide the basis and direction for introducing and implementing Ngolo cultivation technology for soil and water conservation in Uluguru and Usambara mountains.

**Main Objective:**

The general objective of the study was to investigate the causes of environmental degradation and introduction of Ngolo cultivation technology for water and soil management that would lead to sustainable production practices contributing to increase crop production and environmental conservation.

## METHODOLOGY

A survey was carried out in three villages namely Bigwa, Peko Misegese and Tangeni B situated in the Uluguru Mountains and the other two villages are Minsalai and Mashewa in Usambara mountains. The Choice of the sites and villages was made on the basis of the level of land degradation, which appears to advance as the population increases, altitude, and agricultural practices, which affects land degradation. In order to involve community members in all aspects of the study, an interactive bottom-up approach was employed. Different techniques were employed in collecting data from the purposively selected villages.

- Questionnaires were administered to randomly selected households sample size (217 households)
- Meetings were conducted with village leaders, village elders and farmer's to discuss on the impact of environmental degradation on household food security and land productivity.
- Individual discussions with heads of institutions such as Sokoine University of agriculture and district agricultural officers of respective districts.
- Observation of the physical environment of the villages and the neighboring villages.

The climax of the exercise was achieved by holding a village meeting with about 40 farmers in each village to discuss in detail about the environmental problems and the conservation measures taken. Ngolo cultivation technology and its success in Mbinga districts were introduced to farmers. During the meeting 100 interested farmers were selected to participate in Ngolo cultivation technologies. Gender aspects were put into consideration.

**Table 1: Number of the interviewed respondents**

| Region | District | No of Village. | Village Names | Number of Male Respondent | Number of Female respondents | Total number |
|---|---|---|---|---|---|---|
| Morogoro Uluguru mountains | Morogoro | 1 | Bigwa | 30 | 20 | 50 |
| | Mvomero | 2 | Tangeni<br>Peko Misegese | 25<br>25 | 17<br>20 | 42<br>45 |
| Tanga Usambara Mountains | Muheza | 2 | Minsalai<br>Mashewa | 25<br>25 | 15<br>15 | 40<br>40 |
| Total | | 5 | | 130 | 87 | 217 |

## RESULTS AND DISCUSSION

### HOUSEHOLD CHARACTERISTICS

Results from the survey showed that, the average household size varied from 7 in Usambara Mountain to 8 in Uluguru Mountains. However, there was no statistical significant difference in number of people working on the farm in all two regions with an average of 2 to 3 people engaged in farming activities. These were mainly the husband and wife.

The average age of respondent's ranges from 44 years in Uluguru Mountains to 46 years in Usambara Mountains. These results indicate that the majority of the household heads are in the economically active age group.

Data on education shows that about 88% of the respondents have attended primary education (1 to 7 years) with an average of 6 years of formal education. The increased level of education has a great importance in conveying intended messages such as leaflet and posters by change agents. It can also improve the level of understanding during training.

About 90% of the respondents had farming experiences of more than 15 years while 10% had practiced farming for less than 10 years. While, eighty five percent indicated that they owned plots of sizes ranging from 1-2 ha and the remaining 15% had farm plot sizes ranged between 2-4 ha. Generally the farm plots were small and scattered in several areas as each respondent reported having at least 3 plots, which were located at different places within the village. Nevertheless, 50%

of these farm plots were located around the respondent's homesteads. The other half of farm plots, for most of the respondents were located within a radius of 5 km from their homestead.

## CROP PRODUCTION

The crops cultivated in Usambara and Uluguru mountains are numerous. However, the common ones include maize, beans, groundnuts, sorghum, millet, cassava, banana, tea, coffee, spices and cocoa. However, yields from these crops have been declining over the years due to decrease in agricultural land, poor agricultural practices (e.g., continuous cropping along the sloppy hills), and poor rainfall pattern and poor soil fertility. One of the explanation for the unreliable nature of rainfall is that the Uluguru mountain catchments have been victims of gross mismanagement for the last two or more decades.

## ENVIRONMENTAL IMPACT

### Types Of Environmental Degradation

Environmental considerations are globally important in today's human activities including agriculture, taking into account that loss of land potential is directly linked to low production and productivity. Seventy percent of the interviewed farmers are aware of environmental degradation in the study area.

Deforestation and soil erosion were reported as major types of land degradation by 58% and 40% of the total responses. Table 2. gives a summary of findings.

**Table 2: Types of land Degradation as mentioned by farmers in %**

| **Type** | **% Household responded** |
|---|---|
| **Aware of environmental degradation** | 70 |
| Soil erosion | 40 |
| Deforestation | 58 |
| Destruction of water sources | 1 |
| Other types | 1 |

## CAUSES OF LAND DEGRADATION

Most of the interviewed farmers in Uluguru and Usambara mountains indicated that the major causes of soil erosion, deforestation and destruction of water sources are inappropriate farming practices, bush fires, tree cutting for fuel wood and for making charcoal (Table3). Most farmers perceive inappropriate farming practices as the major cause of soil erosion (50%)and deforestation (50%). Also bush fire (30%) and fuel wood (29%) contribute to soil erosion and deforestation respectively.

**Table 3: Causes of environmental degradation**

| Type | Causes | % Of Household responded |
|---|---|---|
| Soil erosion | Cultivation practices | 50 |
| | Bush fires | 30 |
| | Fuel wood | 15 |
| | Charcoal making | 3 |
| | Others | 2 |
| Deforestation | Cultivation practices | 50 |
| | Bush fires | 9 |
| | Fuel wood | 29 |
| | Charcoal making | 5 |
| | Others | 7 |

### Soil erosion

Soil erosion is a serious problem in these areas, particularly when floods occur. Poor agricultural practices, lack of plant cover brought about by tree felling, cultivation on steep slope and clearing marginal land for agricultural use are main causes of soil erosion. The reduction in the fallow period and longer periods of exploitation of the same piece of plot accelerates soil erosion, decline in soil fertility, encrustation and compaction of topsoil.

**Deforestation**

Farmers are aware that environmental degradation exists in their villages. Trees are being cut indiscriminately to pave way for new farms and building materials. Plant cover on hills, hill slopes, river valleys and lowlands has considerably reduced the agricultural potential of these areas. Subsequently, new arable land, which is also not available to be, found and put in use.

Shifting cultivation, which used to be practiced is no longer possible due to scarcity of arable land and increased population in the villages. Consequently, the regeneration of vegetation cover has drastically been reduced. The net result of this situation is poor yields, deterioration of the ecological environment in the villages.

**Use of fire as a cultivation practice and its Implications**

Study in Uluguru and Usambara mountains revealed that bush fire is mostly done during preparation of new plots and even old ones that have been left to fallow for some years and sometimes fire gets out of control during the clearing of land for planting. Results revealed that continued use of fire as an agricultural practice in clearing of bushes for new virgin farms have led to the encroachment of desert-like features and reduction of plant cover exposing the top soil to variations in temperature which enhances the destruction of soil structure, increasing compaction, reduction in the population and variety of soil organisms. In addition, the exposure of the topsoil makes it easier for soil moisture to be lost, wind to erode and carry away soil particles, thus removing the layer of soil, which is fertile and potentially productive. In the end villager's experience lower agricultural yields and their food security remains a threat.

## FARMER'S RESPONSE TO SOIL AND WATER CONSERVATION MEASURES

Results from the survey revealed that only a low percentage of households have been undertaking land improvements practices such as ridge making, contour and terraces. However, villager's and village government have put in place their own by-laws to safeguard the environment, but it has been difficult to implement these by laws due to lack of commitment of both partners.

| **Conservation Measures:** | **% Of Household responded** |
|---|---|
| Contour farming | 1 |
| Agro forestry | 6 |
| Terraces | 1 |
| Ridges | 7 |
| By-laws | 85 |

## RECOMMENDATIONS

- The study recommends that Ngolo cultivation technology should be promoted in both severely and less severely affected areas. Farmers should be encouraged to promote and plant other tree crops in order to alleviate the current situation. The proposed crops include beans, groundnuts, maize, mango, coconut, citrus and other trees. This move will assist farmers in increasing their income, household food security and conserve the environment.
- To sensitize villagers on the relationship that exists between human beings and the environment as well as the effects of destroying the environment on the quality of their life. Campaigns and meetings can be done initially to raise the villager's awareness followed by educational and training programmes concentrating on use and preservation of forests and general management resources.
- Prohibit bush fires through by laws
- Introduce a forestation program this should involve planting of trees in open common lands.

## CONCLUSION

Agricultural production in the study area is largely extractive. About 70% of the interviewed farmers are aware of issues related to environmental degradation. However, only few percentage of households have been undertaking land improvements largely on their own initiative.

Continued use of fire as an agricultural practice in clearing of bushes for new virgin farms have led to environmental destruction due to reduction of plant cover exposing the top soil to variations in temperature which enhances the destruction of soil structure, increasing compaction, reduction in the population and variety of soil organisms. In addition, the exposure of the topsoil makes it easier for soil moisture to be lost, wind to erode and carry away soil particles, thus removing the layer of soil, which is fertile and potentially productive.

Intervention in the area of soil-water management is therefore required to tackle the problems of land degradation and non-reliability of rainfall.

Promotion of Ngolo cultivation technology to Uluguru and Usambara Mountains is very important for the survival of the coming generation. This technology have been tested in Uluguru Mountains for three years and proved to be environmentally sound and productively sustainable. Also more than 99% of the interviewed farmers are willing to learn about the Ngolo cultivation technology.

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